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A METHOD AND ARRANGEMENT FOR WIRELESS DATA TRANSMISSION

The present invention relates to a method and to an arrangement for wireless, data transmission. More specifically, the invention relates to the transmission of data by digital broadcasting transmissions.

The present invention relates primarily to a method and to an arrangement for transmitting data from one computer to one or more other computers with the aid of a radio transmitter and one or more receivers, so as to enable data to be transmitted in applications using equipment produced in accordance with the international standard DAB (Digital Audio Broadcast).

This standard DAB is described in prETS 300 401 radio Broadcasting Systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers, February, 1997. The invention is not limited to this standard, however, but can be applied equally as well with digital radio transmissions according to some other standard.

Frequencies are at present allotted to land-based DAB transmissions over the whole of Europe. The frequency spaces primarily used are TV channels in VHF band 111. Each DAB channel can transmit 2.304 Mbit/s gross, which corresponds, for instance, from five to six high-quality stereo programmes.

The modulation and signal processing technique chosen in accordance with the DAB standard is COFDM (Coded Orthogonal Frequency Division Multiplex), which enables all transmitters in a region-covering network to send the same signals on the

same frequency without creating interference problems due to co-channel interference.

According to this standard, the entire bit stream in the DAB signal is transmitted in frames that have a typical duration of 96 ms. Each frame combines data from three channels, namely from the main service channel MSC, from the fast information channel FIC and from the synchronization channel.

The main service channel MSC may contain both service information, ISO/MPEG-coded audio signals and general data transmission in packet mode or stream mode. A so-called multiplex controller determines how the various information components shall be combined. This control information is sent separately in the fast information channel FIC. The mutual division between the information components can be controlled dynamically in accordance with requirements. The information channel FIC also discloses how data in the main service channel shall be interpreted at each moment in time.

The entire main service channel MSC can be used, in principle, for data transmission, giving a net bit rate of 1.2 to 1.5 Mbit/s.

The DAB standard is primarily intended to enable six to seven high-quality stereo radio programmes to be transmitted in each DAB channel of about 2 Mhz, although the distribution of the content of a DAB channel, called an ensemble, can be allocated dynamically and used for purposes other than the transmission of digitalized and compressed sound channels. The standard also provides space for the transmission of data in greater or smaller parts of a DAB channel, either with a

limited transmission requirement in the form of packet switched data quantities in a simpler case, or for the highest data rate of up to 2 Mbit/s when the entire ensemble is disposed for data transmission in a stream mode.

According to the aforegoing, the DAB system should be capable of transmitting digital data from one computer to one or more other computers, at a rate of up to 1.5 Mbit/s.

One serious problem in this regard, however, is that a computer is not designed to receive a more or less continuous DAB data stream, since a computer that typically includes the standardized PCI bus is designed to perform PCI bus transactions in the form of bursts.

The present invention solves this problem and enables data to be transferred between computers with the aid of the DAB system.

Many computers are, at present, connected to cable networks or tele-networks for the exchange of information between different computers. When several computers shall receive certain information from one computer, this latter computer must be connected to each of the other computers in an ordered sequence. This is both time-consuming and expensive.

The cost of transmitting ether-carried information with the aid of the present invention can be drastically reduced while many receivers can be reached simultaneously.

An example of one application is found in the transmission of price information from a wholesaler in the daily commerce to

all stores, shops, etc., that belong to the wholesaler. The use of ether-bound information transmission would enable all price information to be sent to all stores at one and the same time and also very quickly. Another obvious application is found in the distribution of news and advertisements, i.e. principally in a newspaper.

Another important advantage would be afforded if a receiver need not be stationary but can be mobile. One example in this respect is found in rescue services and police services, to particular benefit. Information concerning a rescue service, emergency service, or a police service could be sent to mobile units, i.e. to rescue vehicles and police cars. Such transmission would facilitate the co-ordination of personnel, etc., in rescue operations and police operations of comprehensive magnitude, by virtue of all parties concerned receiving updated information simultaneously.

However, the present invention is not limited to any particular application, but can be used in any context where information shall be transmitted between computers.

The present invention thus relates to a method for the wireless transmission of data between one computer and one or more other computers with the aid of the DAB system or a corresponding system for the digital, wireless transmission of data, wherein the transmitting computer is connected to a DAB transmitter, wherein the receiving computer or the receiving computers is/are connected to a respective DAB receiver, and wherein the method is characterized in that information outputted intermittently from the transmitting computer is stored intermediately in a memory in a first

adaptation circuit, between the transmitting computer and the DAB transmitter, in that information is fed from said memory to the DAB transmitter essentially continuously under the control of an outfeed oscillator in the adaptation circuit, in that transmitted information is received by a DAB receiver and fed into a memory in a second adaptation circuit under the control of an input oscillator in said second adaptation circuit, in that the two oscillators operate on the same or essentially the same frequency, and in that the receiving computer is caused to take information intermittently from the memory store in the second adaptation circuit.

The invention also relates to an arrangement that has the main features defined in Claim 5.

The present invention will now be described in more detail with reference to exemplifying embodiments thereof and also with reference to the accompany drawing, in which Figure 1 is a block schematic illustrating a transmitter side and a receiver side.

Shown in the Figure is an arrangement for the wireless transmission of data between a computer 1 and one or more other computers 2 with the aid of the DAB system or a corresponding system for the wireless transmission of digital data. Such a corresponding system may be a system for digital TV transmissions. The transmitting computer 1 is connected to a known DAB transmitter 3 that has a transmitter antenna 5. The receiving computer or computers 2 is/are connected to a respective known DAB receiver 4 that has a receiver antenna 6.

The inventive arrangement includes a first adaptation circuit 7 between the transmitting computer 1 and the DAB transmitter 3. The adaptation circuit 7 is adapted for the intermediate storage of information outputted intermittently from the transmitting computer 1 in a memory 8 belonging to said adaptation circuit. The memory may be a RAM memory or a FIFO memory. The adaptation circuit is also adapted to take information from the memory 8 and feed this information to the DAB transmitter 3 generally continuously under the control of an outfeed oscillator 9 in the adaptation circuit 7. The oscillator 9 controls the outfeed of information from the memory 8 to the DAB transmitter 3, via an outfeed circuit 10 of some suitable known kind.

A second adaptation circuit 11 is provided between respective DAB receivers 4 and receiving computers 2. This second adaptation circuit 11 is adapted to feed information received by the DAB receiver 4 into a memory store 12 in the second adaptation circuit under the control of an infeed oscillator 13 in said second adaptation circuit. The oscillator 13 controls the infeed of information from the DAB receiver 4 to the memory 12, via an infeed circuit 14 of some suitable known kind. The memory 12 may be a RAM memory or a FIFO memory.

The two oscillators 9, 13 are adapted to operate at mutually the same frequency, or at essentially the same frequency, in accordance with the DAB standard.

The receiving computer 2 is adapted to fetch information intermittently from the memory 12 in the second adaptation circuit.

In one preferred embodiment, the oscillator 13 in the second adaptation circuit 11 is adapted to be synchronized with the oscillator 9 in the first adaptation circuit, by locking the frequency of the second oscillator 13 to a reference included in the received signal. This can be achieved by including in the second adaptation circuit 11 a microprocessor 15 that functions to detect the signal received by the DAB receiver and to decode a predetermined part of said received signal that constitutes said reference and therewith activate the oscillator 13.

In one preferred embodiment, the microprocessor 15 is adapted to determine from a FIC (Fast Information Channel) in the DAB system those parts of the received signal that contain data. The microprocessor is also adapted to store received data in the memory 12 of said adaptation circuit.

In one embodiment, the microprocessor 15 includes software that causes the received information to be structured and stored in the memory 12 in a form that enables a standard PC 2 to fetch information from the memory 12. Alternatively, the software can be installed in the personal computer, PC.

In one highly preferred embodiment, the microprocessor 15 in the second adaptation circuit 11 is adapted to identify information that is relevant to the receiving computer 2 and that includes identification of address information and possibly also authorization.

It is thus possible to address one or more of all computers that are connected to a DAB receiver 4.

This enables, for instance, a convenience goods wholesaler or dealer who sends information relating to prices of goods found in shops or stores throughout the country concerned to chose to send price information to stores in different parts of the country, when the prices of goods vary in different parts of the country at mutually different times.

The possibility of detecting authorization is achieved by programming the microprocessor so that it will only feed received information into the memory 12 when the information received includes an authorization code. This authorization can be given, for instance, by providing a subscriber that has a DAB receiver with a smart card that is read by a card reader 16 connected to the microprocessor 15 and containing said authorization code. The microprocessor is, in this regard, adapted to compare an authorization code received by the DAB receiver with the authorization code entered by means of the smart card. This embodiment can be used, for instance, when the information transmitted includes various types of news. Only subscribers that have paid for their subscription and therewith obtained a smart card which includes a valid authorization code can receive the transmitted information.

Thus, the information to be transmitted is stored intermediately in the memory of the first adaptation circuit. The information to be transmitted is sent via the DAB system in a more or less continuous form, whereas information is delivered intermittently from the transmitting computer 1, as before mentioned. Thus, the information is outputted to the DAB transmitter from said memory 8 essentially continuously and under the control of the outfeed oscillator 9. Transmitted information is thus received by the DAB receiver

in an essentially continuous form, and is fed into the memory in the second adaptation circuit 11 under the control of the infeed oscillator 13. The receiving computer is then caused to fetch information intermittently from the memory in the second adaptation circuit.

The present invention thus enables information to be transmitted via the DAB system, or some corresponding system for the wireless transmission of data, at high speed and in a more or less continuous form between standard computers, such as typical personal computers, PCs, which are not constructed to output and input data essentially continuously but, instead, constructed to output and input information in bursts.

The present invention thus solves the problem mentioned in the introduction.

Adaptation circuits 7, 11 have been described in the aforegoing. These circuits may be physically separate units or may comprise an electronic card that can be mounted in a PC or some other computer. Naturally, the invention does not solely apply to personal computers and can be applied to all types of computers.

The adaptation circuit may, of course, be constructed in many different ways for achieving the aforedescribed function. It will be obvious to the person skilled in this art that the structural design of the adaptation circuits can vary.

The present invention is thus not limited to the aforedescribed exemplifying embodiments thereof since

variations and modifications can be made within the scope of the following Claims.